PUBLICATIONS.

Notes on some Eruptive Rocks from Gallatin, Jefferson and Madison Counties, Montana. By GEORGE P. MERRILL, Proc. U. S. National Museum, Vol. XVII., pp. 637–673, Washington, 1895.

In these notes Professor Merrill has described some of the more interesting rocks of those collected by Dr. A. C. Peale and himself in the parts of Montana named in the title. The notes are arranged according to the geographical occurrence of the rocks rather than upon a petrographical basis, which latter would have been more convenient for reference. The rocks are in part extrusive, including basalt, several kinds of andesite and rhyolite; and in part intrusive, embracing a wide range, from syenite and diorite to peridotite and pyroxenite, and including a number of porphyritic rocks some of which are lamprophyres.

The andesites are normal for this region and are only briefly described. In the case of a hypersthene-andesite a complete chemical analysis is published. The rhyolites and basalts are normal, except for a quartz-bearing basalt like those found in other parts of western America. Diabase and diorite of various kinds are briefly mentioned. Several peridotites are described in considerable detail. They occur in areas of crystalline schists but appear to be of eruptive origin. The rocks are classed as wehrlite, hornblende-picrite, saxonite (harzburgite). Closely related to them in composition and mode of occurrence are certain pyroxenites, one of which is hornblende-hypersthenite, while another is websterite. The value of these descriptions is enhanced by complete chemical analyses, which fortunately have been made from very fresh material.

The special interest of the paper lies in the description of a number of lamprophyric rocks and of closely associated syenitic porphyries; besides several porphyritic rocks described as porphyrite (?), augite-porphyrite, and in one case as basalt (?) These descriptions are full and embrace the chemical composition of the rocks and also of some of the more prominent constituent minerals. One class

carry phenocrysts of olivine and augite, but none of feldspar. The groundmass is extremely fine grained and is in part obscured by alteration products. It is basaltic to a great extent, but contains orthoclase in microscopic crystals, or else shows upon analysis a relatively high content of alkalies. Mica is also a prominent constituent in some instances. Professor Merrill's remark upon the mutual interference of the phenocrysts of augite and olivine, namely, that it "can be accounted for only on the supposition that neither mineral is a direct secretion from the magma, but that they are residuals of an earlier crystallization in which consolidation had proceeded so far that free growth was no longer possible," appears to the reviewer to be greatly in error. One need only mention the pegmatitic intergrowth of phenocrysts of quartz and orthoclase in certain obsidians and pumices, and the mutual penetration of pyroxene and hornblende in phenocrysts in some glassy andesites. Chemically the rocks belong with lamprophyres, and resemble some rocks found in the Absaraka Range, in the Yellowstone National Park.

The porphyrite-like rocks carry phenocrysts of plagioclase in addition to those of augite and olivine, and have a groundmass in which orthoclase occurs in connection with plagioclase. The syenitic rocks are closely associated with the lamprophyric ones: and in one case the chemical composition of the syenite is very similar to that of the sodalite-syenite of Square Butte, Highwood Mountains, Montana, as pointed out by Professor Merrill. The reviewer hopes to be able to present shortly in this JOURNAL an account of the closely related series of rocks occurring in the neighboring region of the Yellowstone Park, to which Professor Merrill has referred in his article.

J. P. I.

Highwood Mountains of Montana. By WALTER H. WEED and LOUIS V. PIRSSON. Bull. Geol. Soc. Am., Vol. 6, pp. 389–422. Pls. 24–26. Rochester, April 1895.

The situation and topographic features of the Highwood Mountains are briefly described, and the geologic structure of the district is pointed out. The mountains consist of the denuded remains of volcanoes whose rocks show extreme differentiation of a highly alkaline magma. There are several volcanic cores now filled with massive granular rock. These are surrounded by tuffs and volcanic breccias with lava-flows and a great number of radiating dikes.